

## Claims

What is claimed is:

Sub B1  
1. A voice coil actuator arm comprising:  
2 a head arm collection including a first head arm, a second head arm and a third  
3 head arm;  
4 wherein each member of said head arm collection is comprised of:  
5 at least one ground plane formed in said head arm collection member; and  
6 a first and a second pair of coplanar, parallel transmission paths essentially  
7 parallel to said ground plane interconnecting both a read differential wire pair and a write  
8 differential wire pair to a head slider, respectively;  
9 said first parallel transmission path pair interconnects to a disk drive read  
10 interface; and  
11 said second parallel transmission path pair interconnects to a disk drive write  
12 interface.

1 2. The apparatus of Claim 1,  
2 wherein said first head arm is further comprised of:  
3 a third and a fourth pair of coplanar, parallel transmission paths essentially  
4 parallel to said ground plane interconnecting both a second read differential wire pair and  
5 a second write differential wire pair to a second head slider, respectively;  
6 said third parallel transmission path pair interconnects to a second disk drive read  
7 interface; and  
8 said fourth parallel transmission path pair interconnects to a second disk drive  
9 write interface.

1 3. The apparatus of Claim 1, further comprising:  
2 an analog interface interconnecting said first parallel transmission path and said  
3 disk read interface, for at least one of said head arm collection members; and  
4 said analog interface interconnecting said second parallel transmission path and  
5 said disk write interface, for at least one of said head arm collection members.

1 4. The apparatus of Claim 1, further comprising:

2 an analog interface interconnecting said first parallel transmission path and said  
3 disk read interface, for each of said head arm collection members; and

4 said analog interface interconnecting said second parallel transmission path and  
5 said disk write interface, for each of said head arm collection members.

1 5. A disk drive comprising said voice coil actuator arm of Claim 1.

1 6. A method for a head arm providing electrical interconnection of a read differential  
2 wire pair and a write differential wire pair between a head slider and a disk drive read  
3 interface and a disk drive write interface, respectively, comprising the steps of:

4 creating a ground plane in said head arm;

5 providing at least two differential signal paths as essentially parallel, coplanar  
6 traces on said head arm traversing an essentially fixed distance parallel to said ground  
7 plane as a first differential trace pair and a second differential trace pair;

8 providing connectivity to said head slider for said read differential wire pair and  
9 for said write differential wire pair via said first and said second differential trace pair,  
10 respectively;

11 providing connection to said disk drive read interface via said first differential  
12 trace pair; and

13 providing connection to said disk drive write interface via said second differential  
14 trace pair.

1 7. A method providing electrical interconnection by a voice coil actuator arm  
2 through at least one head arm between at least one head slider coupled to said head arm  
3 and a disk drive read interface and a disk drive write interface, for said head slider,  
4 comprising the steps of:

5 said head arm providing electrical interconnection between said head slider and  
6 said disk drive read interface and said disk drive write interface as in Claim 6.

1 8. The method of Claim 7, further comprising the steps of:  
2 providing a third differential signal path and a fourth differential signal path as  
3 essentially parallel, coplanar traces on said head arm traversing essentially parallel to said  
4 ground plane as a third differential trace pair and a fourth differential trace pair;  
5 providing connectivity to a second head slider for a second read differential wire  
6 pair and for a second write differential wire pair via said third differential trace pair and  
7 said fourth differential trace pair, respectively;  
8 providing connection to a second disk drive read interface via said third  
9 differential trace pair; and  
10 providing connection to a second disk drive write interface via said fourth  
11 differential trace pair.

1 9. The method of Claim 8,  
2 wherein said voice coil actuator arm is further comprised of a second head arm;  
3 and  
4 said method is further comprised of the steps of:  
5 said second head arm providing electrical interconnection between a third head  
6 slider and a third disk drive read interface and a third disk drive write interface as in  
7 Claim 6.

1 10. The method of Claim 9,  
2 wherein said voice coil actuator arm is further comprised of a third head arm; and  
3 said method is further comprised of the steps of:  
4 said third head arm providing electrical interconnection between a fourth head  
5 slider and a fourth disk drive read interface and a fourth disk drive write interface as in  
6 Claim 6.

1 11. The method of Claim 7,  
2 wherein the step providing connection to said disk drive read interface via said  
3 first differential trace pair is further comprised of the steps of:

4 providing a first read analog interface connection to said first differential trace  
5 pair; and

6 providing a first disk read analog interface connection to said disk drive read  
7 interface; and

8 wherein the step providing connection to said disk drive write interface via said  
9 second differential trace pair is further comprised of the steps of:

10 providing a first write analog interface connection to said second differential trace  
11 pair; and

12 providing a first disk write analog interface connection to said disk drive write  
13 interface.

1 12. A method of operating a disk drive, comprising: the steps of Claim 7.

1 13. The method of Claim 6, further comprising the steps of:

2 providing a third differential signal path and a fourth differential signal path as  
3 essentially parallel, coplanar traces on said head arm traversing an essentially fixed  
4 distance parallel to said ground plane as a third differential trace pair and a fourth  
5 differential trace pair;

6 providing connectivity to a second head slider for a second read differential wire  
7 pair and for a second write differential wire pair via said third and said fourth differential  
8 trace pair, respectively;

9 providing connection to a second disk drive read interface via said third  
10 differential trace pair; and

11 providing connection to a second disk drive write interface via said fourth  
12 differential trace pair.

1 14. A head arm comprising:

2 at least one ground plane formed in said head arm; and

3 a first and a second pair of coplanar<sup>a</sup>, parallel transmission paths essentially  
4 parallel to said ground plane interconnecting both a read differential wire pair and a write  
5 differential wire pair to a head slider;

TOP SECRET

6 said first parallel transmission path pair interconnects to a disk drive read  
7 interface; and

8 said second parallel transmission path pair interconnects to a disk drive write  
9 interface.

1 15. A voice coil actuator arm comprising at least one head arm as in Claim 14.

1 16. The apparatus of Claim 15,

2 wherein said head arm is further comprised of:

3 a third and a fourth pair of coplanar, parallel transmission paths essentially  
4 parallel to said ground plane interconnecting both a second read differential wire pair and  
5 a second write differential wire pair to a second head slider;

6 said third parallel transmission path pair interconnects to a second disk drive read  
7 interface; and

8 said fourth parallel transmission path pair interconnects to a second disk drive  
9 write interface.

1 17. The apparatus of Claim 16, further comprising:

2 a second head arm as in Claim 15 interconnecting a third head slider, a third disk  
3 read interface and a third disk write interface.

1 18. The apparatus of Claim 17, further comprising:

2 a third head arm as in Claim 15 interconnecting a fourth head slider, a fourth disk  
3 read interface and a fourth disk write interface.

1 19. The apparatus of Claim 15, further comprising:

2 an analog interface interconnecting said first parallel transmission path and said  
3 disk read interface; and

4 said analog interface interconnecting said second parallel transmission path and  
5 said disk write interface.

TOP SECRET 652200T

1 20. A disk drive comprising said voice coil actuator arm of Claim 15.

1 21. The apparatus of Claim 14, further comprising:

2 a third and a fourth pair of coplanar, parallel transmission paths essentially  
3 parallel to said ground plane interconnecting both a second read differential wire pair and  
4 a second write differential wire pair to a second head slider;

5 said third parallel transmission path pair interconnects to a second disk drive read  
6 interface; and

7 said fourth parallel transmission path pair interconnects to a second disk drive  
8 write interface.

1 22. A method for manufacturing a head arm electrically interconnecting a head slider  
2 with a disk drive read interface and a disk drive write interface, comprising the steps of:

3 creating a ground plane in said head arm; and

4 providing at least two differential signal paths as essentially parallel, coplanar  
5 traces on said head arm traversing an essentially fixed distance parallel to said ground  
6 plane as a first differential trace pair and a second differential trace pair;

7 wherein providing connectivity to said head slider via said first and said second  
8 differential trace pair;

9 wherein said first differential trace pair provides connection to said disk drive  
10 read interface; and

11 wherein said second differential trace pair provides connection to said disk drive  
12 write interface.

1 23. Said head arm as a product of the process of Claim 22.

1 24. A method of manufacturing a voice coil actuator arm, comprising the steps of:

2 using said head arm of Claim 23 to provide electrical interconnection between  
3 said head slider and said disk drive read interface and said disk drive write interface.

4

5

1 25. The method of Claim 24,  
2 wherein said head arm is a product of the process of Claim 22 further comprising  
3 the steps of:

4 providing a third differential signal path and a fourth differential signal path as  
5 essentially parallel, coplanar traces on said head arm traversing an essentially fixed  
6 distance parallel to said ground plane as a third differential trace pair and a fourth  
7 differential trace pair;

8 providing connectivity to a second head slider for a second read differential wire  
9 pair and for a second write differential wire pair via said third and said fourth differential  
10 trace pair, respectively;

11 providing connection to a second disk drive read interface via said third  
12 differential trace pair; and

13 providing connection to a second disk drive write interface via said fourth  
14 differential trace pair.

1 26. The method of Claim 25,  
2 wherein said voice coil actuator arm is further comprised of a second head arm;  
3 and

4 said method is further comprised of the steps of:

5 manufacturing said second head arm to provide electrical interconnection between  
6 a third head slider and a third disk drive read interface and a third disk drive write  
7 interface as in Claim 23.

1 27. The method of Claim 26,  
2 wherein said voice coil actuator arm is further comprised of a third head arm; and  
3 said method is further comprised of the steps of:

4 manufacturing said third head arm to provide electrical interconnection between a  
5 fourth head slider and a fourth disk drive read interface and a fourth disk drive write  
6 interface as in Claim 23.

7  
8

1 28. The method of Claim 24, further comprising  
2 providing a first read analog interface connection to said first differential trace  
3 pair;  
4 providing a first disk read analog interface connection to said disk drive read  
5 interface;  
6 providing a first write analog interface connection to said second differential trace  
7 pair; and  
8 providing a first disk write analog interface connection to said disk drive write  
9 interface.

1 29. A method of manufacturing a disk drive comprising the step of using said voice  
2 coil actuator arm as a product of Claim 24.

1 30. Said disk drive as a product of the process of Claim 29.

4302 63200